



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22304-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/937,107	09/19/2001	Klaus Sonnenberg	56383/70301	4728

21874 7590 05/29/2003

EDWARDS & ANGELL, LLP
P.O. BOX 9169
BOSTON, MA 02209

EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 05/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/937,107

Applicant(s)

SONNENBERG ET AL.

Examiner

Matthew J Song

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 14-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 14-23, 25-30, 32-36 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Althaus et al (Some new designs features for vertical Bridgman furnaces and the investigation of small angle grain boundaries developed during VB growth of GaAs, Journal of Crystal Growth 166 (1996) pg 566-571) in view of Scully et al (US 2,281,718).

Althaus et al discloses a vertical Bridgman furnace in Fig 1 for producing a monocrystal from a melt of raw materials with a heating appliance for generating a temperature gradient within the melt of raw material, wherein the heating appliance comprises a rotationally symmetrical furnace **3** with a rotation axis and with an essentially level floor heater **1** and an essentially level cover heater **2** that can be controlled to different temperatures. Althaus et al also discloses the cover heater **2** is kept at a temperature somewhat higher than the melt temperature of GaAs while the temperature of the floor heater **1** is reduced in a controlled way to shift a growth front upwards (col 1-11).

Althaus et al does not disclose an insulation device that is structured and arranged in such a way that a heat flow in a radial direction perpendicular to the rotation axis of the furnace can be controlled at a preset rate.

In a method of forming an ingot using unidirectional solidification (pg 2, col 2, ln 40-75), Scully et al teaches an ingot forming chamber is externally circumferentially surrounded by a conservator of heat **12** having the general plane of its inner wall paralleling a mold (pg 3, col 2, ln 5-75 and pg 3, col 1, ln 1-75). Scully et al also teaches a heat insulating material **14** in the conservator **12** is wider in cross-section relative to height to indicate the desirability of increasing the heat insulating effectiveness of the conservator (pg 5, col 2, ln 5-35 and Fig 1-3); the conservator **12** reads on applicant's insulating device. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Althaus et al with Scully et al's insulating device improve the insulating effectiveness near the upper region of the chamber, which is held at a higher temperature than a lower region of chamber and promote solidification from bottom levels gradually to top levels ('718, pg 3, col 1, ln 15-25).

Referring to claim 14, the combination of Althaus et al and Scully et al teach an insulating device with a tapered cone body as applicant ('178 Figs 1-3), however the combination of Althaus et al and Scully et al is silent to the device is structured and arranged in such a way that a heat flow in a radial direction perpendicular to the rotation axis of the furnace can be controlled at a preset rate. This is inherent to the combination of Althaus et al and Scully et al's insulating device because the insulating device has a similar tapered structure, as taught by applicant.

Referring to claim 15 and 32, the combination of Althaus et al and Scully et al teaches a tapered insulating device, this reads on applicant's structured and arranged to provide an insulating effect having a gradient from the cover heater to the floor heater.

Referring to claim 16, 22, 30, 33 and 36, the combination of Althaus et al and Scully et al teaches a cylindrical furnace **3** with a controlling to control the temperature of the floor heater to be lower than a temperature of the cover heater and the temperature of the lower plate is reduced in a controlled way (Althaus col 2-3).

Referring to claim 17 and 34, the combination of Althaus et al and Scully et al teaches the insulation device has a tapered cone body with a coaxial cylindrical hollow space that is open at the top and bottom with the tapered end towards the floor heater **10** ('178 Figs 1-3).

Referring to claim 18, the combination of Althaus et al and Scully et al teaches a jacket heater **3**.

Referring to claim 19 and 27, the combination of Althaus et al and Scully et al a heat transmission part having a rotationally symmetrical profiled or un-profiled shape **3**.

Referring to claim 20, 21, 28, 29 and 35, the combination of Althaus et al and Scully et al teaches the surface of each heater is at least 1.5 times the cross section of the monocrystal, where a heating surface having a ratio to a surface of a monocrystal to be produced to provide a temperature that is essentially homogeneous over a radial cross-section of the monocrystal and temperature gradient between the floor heater and the cover heater that is essentially constant is inherent because the combination of Althaus et al and Scully et al teaches a similar surface area of each heater as applicant (Althaus Fig 1).

Referring to claim 23, the combination of Althaus et al and Scully et al teaches a clearance between the floor heater and the cover heater, the clearance being greater than the length of a monocrystal to be produced (Fig 1).

Art Unit: 1765

Referring to claim 25, the combination of Althaus et al and Scully et al a crucible between the floor heater and the cover heater (Fig 1).

Referring to claim 26, the combination of Althaus et al and Scully et al teaches a controller to control a temperature of the floor heater to be lower than a temperature of a cover heater, an insulator device **12** with a tapered body, this reads on applicant's structured to provide an insulating effect having a gradient from the cover heater to the floor heater, a jacket heater for the furnace **3**, a crucible and a clearance between the floor heater and the cover heater (col 3-4 and Fig 1).

Referring to claims 38-39, the combination of Althaus et al and Scully et al teaches growing a monocrystal of GaAs (col 1-4).

3. Claims 24, 31 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Althaus et al (Some new designs features for vertical Bridgman furnaces and the investigation of small angle grain bounders developed during VB growth of GaAs, Journal of Crystal Growth 166 (1996) pg 566-571) in view of Scully et al (US 2,281,718) as applied to claims 14-23, 25-30, 32-36 and 38-39 above, and further in view of Nestor (US 5,116,456).

The combination of Althaus et al and Scully et al teaches all of the limitations of claim 24, as discussed previously, except the combination of Althaus et al and Scully et al does not teach the insulating device comprises graphite.

In an apparatus for growing single crystal using a vertical temperature gradient, (claim 1) Nestor teaches an insulation envelope comprises insulation plates **173** and **174** and the insulation plates are formed of a fibrous form of graphite. Nestor also teaches graphite insulation is

preferred for fabrication and economic reasons as well as its ability to withstand high temperatures (col 13, ln 30 to col 14, ln 10). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Althaus et al and Scully et al with Nestor's graphite insulation because graphite insulation is preferred for fabrication and economic reasons as well as its ability to withstand high temperatures.

Conclusion

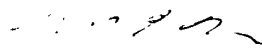
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS
May 27, 2003


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700